

REMARKS/ARGUMENTS

Reconsideration of the application is requested.

Applicant appreciatively acknowledges the Examiner's confirmation of receipt of applicant's certified copy of the priority document for German Patent Application 199 24 861.3, filed May 31, 1999 supporting the claim for priority under 35 U.S.C. § 119.

Claims 1-11 and 13-28 are now in the application. Claims 5-11 and 13-28 are subject to examination and claims 1-4 have been withdrawn from examination. Claims 1, 2, 5, 6, 8 and 11 have been amended. Claims 17-28 have been added. Claim 12 has been canceled.

In "Election/Restriction" on pages 2-3 of the above-identified Office Action, the examiner has mentioned the provisional election with traverse of Group II, claim 5-16 for prosecution at this time. Applicant herewith affirms that election.

Rejoinder of method claims 1-4 is requested under MPEP 821.04 upon the allowance of the product claims. It is noted that the limitation added to the product claims has also been added to the withdrawn method claims herein.

In "Claim Objections" on page 3 of the Office Action, the Examiner objected to claim 6 as having an improper dependency. Appropriate correction has been made.

In "Claim Rejections - 35 USC § 102", item 1 on page 4 of the Office Action, claims 8-10 have been rejected as being fully anticipated by U.S. Patent No. 5,130,208 to Maus et al. (hereinafter Maus '208) under 35 U.S.C. § 102(b).

In "Claim Rejections - 35 USC § 102", item 2 on pages 4-5 of the Office Action, claims 11-12 have been rejected as being fully anticipated by or obvious over U.S. Patent No. 5,519,191 to Ketcham under 35 U.S.C. § 102(b) or 103(a), respectively.

In "Claim Rejections - 35 USC § 102", item 3 on page 5 of the Office Action, claims 11-12 have also been rejected as being fully anticipated by or obvious over U.S. Patent No. 5,588,292 to Hiraishi et al. under 35 U.S.C. § 102(b) or 103(a), respectively.

In "Claim Rejections - 35 USC § 102", item 4 on pages 5-6 of the Office Action, claims 11-12 have additionally been rejected as being fully anticipated by or obvious over U.S.

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Patent No. 5,421,719 to Saito et al. under 35 U.S.C. § 102(b)
or 103(a), respectively.

In "Claim Rejections - 35 USC § 103", item 5 on pages 6-7 of
the Office Action, claim 15 has been rejected as being
obvious over Maus '208 under 35 U.S.C. § 103(a).

In "Claim Rejections - 35 USC § 103", item 6 on page 7 of the
Office Action, claim 16 has been rejected as being obvious
over Ketcham under 35 U.S.C. § 103(a).

In "Claim Rejections - 35 USC § 103", item 7 on page 7 of the
Office Action, claim 16 has also been rejected as being
obvious over Hiraishi et al. under 35 U.S.C. § 103(a).

In "Claim Rejections - 35 USC § 103", item 8 on page 8 of the
Office Action, claims 5-7 and 14 have been rejected as being
obvious over Hiraishi et al. in view of U.S. Patent No.
5,474,746 to Maus et al. (hereinafter Maus '746) under 35
U.S.C. § 103(a).

In "Claim Rejections - 35 USC § 103", item 9 on pages 8-9 of
the Office Action, claim 13 has been rejected as being
obvious over Hiraishi et al. in view of U.S. Patent No.
5,514,347 to Ohashi et al. under 35 U.S.C. § 103(a).

In "Claim Rejections - 35 USC § 103", item 10 on pages 9-10 of the Office Action, claims 5-7 and 14 have been rejected as being obvious over Ketcham in view of Maus '746 under 35 U.S.C. § 103(a).

In "Claim Rejections - 35 USC § 103", item 11 on pages 10-11 of the Office Action, claims 8-10 and 15 have been rejected as being obvious over Ketcham in view of Maus '208 under 35 U.S.C. § 103(a).

In "Claim Rejections - 35 USC § 103", item 12 on page 11 of the Office Action, claim 13 has been rejected as being obvious over Ketcham in view of Ohashi et al. under 35 U.S.C. § 103(a).

The rejections have been noted and the claims have been amended in an effort to even more clearly define the invention of the instant application. Support for the changes is found in the wording describing the layers of the ceramic walls and the incorporation by reference throughout the specification of the instant application.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful. Claim 5 calls for a honeycomb body, comprising:

ceramic walls formed of printed layers forming channels through which a fluid can flow, said channels lying next to one another; and

at least one of at least one measuring sensor and an electrically conductive mass integrated into one of said ceramic walls.

Claim 8 calls for a honeycomb body, comprising:

at least partially ceramic walls formed of printed layers forming channels through which a fluid can flow, said channels lying next to one another; and

at least one of said walls having a structure for influencing a throughflow of the fluid.

Claim 11 calls for a honeycomb body, comprising:

channels through which a fluid can flow;

a plastically deformable and subsequently consolidatable first mass being predeterminably applied in printed layers and consolidated;

at least one second mass forming another printed layer along a section through the honeycomb body next to said first mass; and

said first mass having a property different from that of said second mass.

The Maus '208 Patent relates to a honeycomb body within internal leading edges. More specifically, as shown in Fig. 2 thereof, a honeycomb body includes smooth metal layers 10 and corrugated sheet-metal layers 1 disposed therebetween. The sheet metal layers 1 have inverted regions 4, 5 forming troughs 3 and crests 2 defining channels 8.

Katcham discloses a fluid heater having a heating element 10 with a coating 12 on a substrate 14 as shown in Fig. 1. Fig. 2 discloses a laminated heating element 20 having steel layers 22 with flexible ceramic foil 24 therebetween. Fig. 3 shows a flow-through heater 30 having corrugated heating elements 32 disposed between base elements 34. The elements 32 are multi-layer sheets having a ceramic central layer and metal foils or coatings thereon. The elements 34 are conducting sheets of refractory ceramic. Terminal plates 38 and current leads 39, 40 are also provided. Fig. 4 discloses a flow-through heater 60 having crimped sheets 64 of non-conductive ceramic and a continuous base sheet 62 with a metal core and ceramic layers. A conductive closure 66 is disposed at the outside and a core rod 68 as well as electrical leads 70, 72 are also provided.

Hirashi et al. show an exhaust gas purifier 11 having an extruded non-conducting honeycomb body 12 with passages formed therein, an electrically conducting layer 13 and electrodes 18 connected to a power source 19. An enlarged view in Fig. 2A shows a catalytic layer 14 on the extruded walls of the honeycomb body 12.

Saito et al. similarly disclose a catalyst mass 1 within a catalytic stove. As is shown in Fig. 5 thereof, a non-conductive catalyst support 22 has conductive ceramic 23 and a catalyst coating layer 24 on the extruded catalyst mass.

Maus '746 teaches a catalyst carrier body which is shown in Fig. 1 to have smooth upper and lower layers 11, 12 enclosing a measuring conductor 17 within bulges 13. Similarly, Fig. 2 shows corrugated layers 21, 22 enclosing a measuring conductor 27. A measuring conductor foil 37 is shown in Fig. 3. Fig. 4 discloses smooth sheet metal layers 1 and corrugated sheet metal layers 2 with an upper layer 41 and a lower layer 42 therein and a jacket measuring conductor 45-47.

Ohashi et al. disclose a honeycomb structure which, in Fig. 1(a), is metallic and contains a spiral metal foil 105 within a metallic housing 108 of a honeycomb heater 100. Insulating layers 104 are within the foil 105. Figs. 3 and 5 disclose an extruded, unitary honeycomb body structure having partition walls 32a, 32b with through holes 33, as described in lines 33-39 in column 6 thereof.

The instant application, on pages 5 and 12 thereof, incorporates by reference U.S. Patent No. 5,714,103 to Bauer

et al. Bauer et al. disclose a process for the production of shaped articles with a predetermined pore structure. Although the preferred embodiment of the patent deals with the production of artificial bones, the last paragraph in column 6 thereof discloses the production of ceramic catalyst supports using the same imaging technique taught by Bauer et al.

According to the process of Bauer et al, a ceramic composition is formed which is printed to a layer on a substrate with a first screen. After drying, a second layer is applied to the first layer with a screen and dried again. The procedure is repeated until all layers have been printed and a ceramic green compact is obtained. The compact is then sintered into a ceramic.

The procedure which has just been described is found between lines 54 and 66 in column 5 of Bauer et al. and can be used for producing ceramic catalyst supports as mentioned above. Such catalyst supports have a three-dimensional interconnecting pore structure produced by the process according to Bauer et al.

The invention of the instant application begins with the device having printed layers as disclosed by Bauer et al. and

adds at least one measuring sensor and an electrically conductive mass integrated into one of the ceramic walls formed of the printed layers, as recited in claim 5.

Claim 8 also begins with the Bauer et al. structure and calls for at least one of the walls formed of printed layers having a structure for influencing a throughflow of fluid.

Claim 11 calls for a plastically deformable and subsequently consolidatable first mass formed of printed layers and at least one second mass forming a printed layer. It is noted that original claim 12, which has been canceled, called for the first mass being formed in layers.

New claims 17-28 represent three sets of otherwise identical claims dependent upon claims 5, 8 and 11, respectively. One set of claims states that all of the layers are flat as taught by Bauer et al. and as shown in the honeycomb body 4 of Fig. 1 of the instant application which is built up layer by layer from the first side 6 to the second side 7 as in Bauer et al. The second set of claims states that the layers are perpendicular to the flow direction, which is the orientation of the honeycomb body 4 of Fig. 1. However, the specification of the instant application toward the end of page 13 thereof states that the honeycomb body 4 can also be

constructed horizontally, leading to the third set of claims in which the layers are parallel to the flow direction. Finally, the fourth and last set of claims states that there is a multiplicity of layers disposed on top of and connected to each other as is not only set forth in Bauer et al. but also in the claims and the specification of the instant application.

As discussed above, Ohashi et al. only deal with metal layers while the ceramic body is extruded. The same is true of the extrusion of Saito et al. and Hirashi et al.. Metallic layers are shown in Maus '746 and in Maus '208. Neither Ketcham et al. nor any of the other prior art applied against the claims by the Examiner teach or suggest printed layers having either a measuring sensor and an electrically conductive mass as in claim 5, a structure for influencing throughflow of the fluid as in claim 8 or a plastically deformable and consolidated first mass of printed layers and second mass of a printed layer with different properties, as in claim 11.

Clearly, none of the references show the honeycomb body of the instant application having:

ceramic walls of printed layers and at least one of at least one measuring sensor and an electrically conductive mass integrated into one of the ceramic walls, as recited in claim 5;

at least partially ceramic walls of printed layers and at least one of the walls having a structure for influencing a throughflow of the fluid, as recited in claim 8; or

a plastically deformable and subsequently consolidatable first mass being predeterminably applied in printed layers and consolidated, at least one second mass forming another printed layer along a section through the honeycomb body next to said first mass, and the first mass having a property different from that of the second mass, as recited in claim 11.

In addition, not only is the structure of the claims not taught or rendered obvious by the prior art, but the novel structure provides important advantages as well.

It must be understood that at the time when the invention was made the processes of rapid prototyping and rapid manufacturing were not well known and not widely used in industry. The most important concept of the present invention is that a process (nowadays known as rapid manufacturing) in which a complicated body is produced layer by layer for the first time permits the production of ceramic honeycomb bodies with electrically conductive elements in the ceramic walls or the production of ceramic honeycomb bodies having openings or structures in the inner walls or printed layers of first and second masses.

For this reason, independent claim 5 is directed to a honeycomb body having electrically conductive elements in the

inner walls, claim 8 is directed to a ceramic honeycomb body having structures in the walls and claim 11 calls for printed layers of first and second masses.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claims 1, 5 and 8. Claims 1, 5 and 8 are, therefore, believed to be patentable over the art. The dependent claims are believed to be patentable as well because they all are ultimately dependent on claims 5, 8 or 11.

In view of the foregoing, reconsideration and allowance of claims 1-11 and 13-28 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, counsel would appreciate receiving a telephone call so that, if possible, patentable language can be worked out.

The fee in the amount of \$350.00 for 7 claims in excess of 20, is enclosed herewith.

Petition for extension is herewith made. The extension fee for response within a period of one month pursuant to Section

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1.136(a) in the amount of \$120.00 in accordance with Section
1.17 is enclosed herewith.

Please charge any other fees that might be due with respect
to Sections 1.16 and 1.17 to the Deposit Account of Lerner
and Greenberg, P.A., No. 12-1099.

Respectfully submitted,



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